fact, that when his communication on the discovery of glacial markings was read before the Geological Society of London, it was received with scepticism by Prof. Bonney (and, let us add, though the author does not, by Dr. Blandford also). On turning to the *Journal* of the Society we find that Prof. Bonney considered the observations then adduced by Von Lendenfeld as insufficient to establish his conclusions, and in this opinion we fancy most geologists will be inclined to agree with him. That the conclusions were right after all is a different matter. It is to be regretted that even in this, his latest published summary, Von Lendenfeld does not always supply us with facts on which we can base an independent judgment. The personal opinion of an observer, however skilled, can be no sufficient substitute for these. A single instance will suffice. An important joint expedition was undertaken by the author and Mr. Stirling to examine into the accuracy of the latter's statements as to the downward extension of the ice. After several pages of interesting traveller's gossip we reach the result in words much to the following effect:—"After three-quarters of an hour's ride in the valley bottom we reached an old moraine, which we investigated closely. A dam 35 metres high and 200 broad composed of various (*verschieden*) great blocks of rocks with sharp angles stretched across the valley. A brook flowed through the middle. We are here at a height of from 900 to 1000 metres, and since it is a veritable moraine Stirling is right and our dispute is ended."

We will not offend the susceptibilities of the author by questioning whether this is really a moraine: probably it is; but no convincing proof of the fact appears in the description. One would like to know whether other signs of ice-action were observed in the immediate neighbourhood, in what respects the fragments differed from each other and from those of the adjacent valley slopes, and especially what evidence existed to show that they had been carried down the valley, and how far they are removed from their source. This information could have been conveyed in a few words, and would have been welcomed by inquiring minds, who now may wonder whether after all this dam could by any chance be merely the remains of an ancient landslip. New Zealand is introduced to us on p. 161, and after a short historical account we pass on to the New Zealand Alps and fjords. With regard to the latter the author stoutly maintains their glacial origin: one of his chief arguments resting on their great depth as compared with the sea into which they open. They are apparently submerged rock basins, but although the author may be right in his contention that they are not merely moraine-dammed valleys, yet he altogether overlooks another more probable explanation, depending on unequal subsidence: submergence of the land has certainly taken place, and one has only to concede that the central mountain masses have sunk to a greater extent than the adjacent sea-floor to understand how the previously existing valleys would be converted into fjords. The greatest depth of Milford Sound is 360 metres, and one must travel (so our author tells us) at least 100 kilometres from the coast before this depth is reached at sea; now as the watershed is distant only 30 kilometres from the coast, it is at least as probable, considering the gradient, that we have to do here with differential movements of the land, as with locally concentrated erosive action.

An ingenious attempt to explain the last glacial episode leads to several bold generalizations. The author commences with the assertion that the whole of the southern hemisphere is at present much more severely glaciated than the northern, indeed he goes so far as to state that the northern hemisphere in the middle of the ice period was not much more severely glaciated than the southern is now. Since the mean temperature of the southern is not lower than that of the northern hemisphere the reason for its excessive glaciation must lie in a more uniform climate and a damper atmosphere; and these again are a direct consequence of the greater extent of the oceanic surface.

Let us now suppose the sea-level in the northern hemisphere to rise 100 metres, the lowlands will become submerged (as during the last glacial episode they apparently were) the climatal conditions will then approach those now prevailing in the southern hemisphere, and excessive glaciation will result.

But in the southern hemisphere also, the ice was formerly of much greater extent, and this is not susceptible of the same explanation, since a depression of the land would not greatly affect the existing climate. What, however, would be the effect of a depression of the sea level? The submarine slopes of most of the land in the southern hemisphere are so steep that the present distribution of land and sea would not be largely modified, though the latter should sink 300 metres; on the other hand, the increase in the height of mountains (300 metres) would lead to a descent of the snow line, the growth of snow fields, and a corresponding enlargement of glaciers. Thus the glacial episode in the northern hemisphere might be attributed to an elevation of the sea-level, that in the southern to its depression: and these changes of level may have been produced by a bodily movement of the ocean waters from one hemisphere to the other, a result itself possibly due to a shifting of the centre of gravity of the earth. The author does not explain how to shift the centre of gravity of the earth.

We notice that the author speaks with disrespect of the maps of the Tasman glacier by Mr. W. S. Green, stating that they are nothing like so good as Von Haast's; since however, later explorers prefer them to Von Lendenfeld's own, it would appear that we have here a descending scale of excellence.

After pointing out the failure of Mr. Green to reach the actual summit of Mount Cook, the author gives a glowing account of a successful ascent of his own, not of Mount Cook however, but of the Hochstetter Dome! He therefore claims to be the first who has set foot on the top of a high mountain in New Zealand. We offer him our congratulations.

In commenting on the author's style, which in its lucidity is far more English than German, we must offer a serious protest against his manner of using what he terms our "transcendentally intense adjective." Bob Acres' remark that, "The best terms will grow obsolete. Damns have had their day," does not appear to apply to Australia, where, to judge from our author, they flourish along with other survivors of a Mesozoic age.

AMERICAN FORESTRY.[1]

COMPETENT English authorities on forestry are so rare that no apology is needed for presenting some extracts from a translation from the German, of an important paper by Sir D. Brandis on American forestry. This is in continuation of a similar translation which appeared about a year ago in the columns of NATURE (vol. xliv. p. 60).

Upwards of 1,000,000 acres of forest are required for the annual supply of wooden sleepers for European railways. These forests are properly managed so as to yield a steady return, whilst nothing of the kind can be said of American forests. This explains why German foresters are interested in watching the progress of forest destruction in America, where it is now merely a question of ten or

---

[1] "The Silva of North America." By C. S. Sergent, vols. i.–iv. (Boston and New York. Houghton, Mifflin and Co., 1891–92). Notes on the above by Sir D. Brandis, K.C.I.E., F.R.S., in *Zeitschrift für Forst und Jagdwesen*, October, 1892.

© 1893 Nature Publishing Group

fifteen years before a timber famine must occur, which will greatly enhance the value of European forests.

Brandis explains the present lamentable state of affairs in the United States, as follows:—The Timber Culture Act, which was in force in certain of the States, provided that settlers should plant up with trees one quarter of the area allotted to them, and it was thus hoped to obtain forests in the treeless regions between the Rocky Mountains and the Mississippi river. Large tracts of land have been occupied under this Act, but very little progress has been made in afforestation. It is not difficult in the Republic for people to neglect engagements they have made with the State. It has been recognized for some time past that this law has been practically of little use, and it was therefore abrogated in March, 1891. The law abrogating it, in section 24, empowered the President to demarcate and reserve certain tracts of State forest. Great hopes were therefore entertained, and soon afterwards a proclamation was issued largely extending the Yellowstone Park, in Montana, on the borders of Canada.

This measure had been strongly supported for some time past by the American Forestry Association. The Park is a mountain forest tract on the water-parting between the Rivers Columbia and Missouri, and its preservation and proper management is of immense importance. In October, 1891, the extensive forest tract in Colorado in the Rocky Mountains, in which several large tributaries of the Colorado river have their rise, and containing 1,365,000 acres, was proclaimed as the White River Forest Reserve. It was also expected that a portion of the western slopes of the Sierra Nevada, bordering on the Yosemite National Park, and other localities where the *Sequoia gigantea* flourishes, would be proclaimed as State reserves. These two national parks were previously reserved under older laws. The numerous intelligent friends of forestry in America confidently expected that a beginning would now be made in the demarcation of extensive State forest reserves, and in their scientific management.

The most recent news from America, however, has thoroughly upset these expectations. A Bill has been introduced into Congress, to hand over most of the Yellowstone forest reserve to a railway company. It is considered certain that this Bill will pass the Lower House, and it is not expected that the Senate will refuse to sanction it. Wood merchants, mining speculators, and sheep owners are vigorously agitating against the proposed reserve in the Sierra Nevada, and it is feared that their agitation will carry the day.

The American Forestry Association, which held its tenth annual meeting last January, has "memorialized" the President that instead of making a few reserves here and there, he should proclaim the reservation of all State forests still left to the Union, and arrange for their proper management. Friends of the forest are numerous in America, and insight into the essential necessity of forest protection is spreading, owing to the numbers of Americans who travel in Europe, but in a land where the dollar rules, and where an individual who will not recognize its authority is considered a fool, any steady progress towards State forest management cannot be expected.

Bernhard Fernow, the chief of the Forestry Branch of the Ministry of Agriculture at Washington, still hopes for action in this direction on the part of Congress and the State Executive. At the last meeting of the Forestry Association he rightly urged that æsthetic and sentimental grounds for improving American forests must be left entirely in the background. Only where important material interests are concerned, such as securing a continuous supply of wood, or a supply of water, or climatic considerations, should the State limit the freedom of its citizens in dealing with forests. If, however, for urgent reasons of public utility, it should be necessary to reserve a forest, the State should not be contented with merely demarcating and protecting it, but should introduce scientific management, so that the neighbouring populations may be able to utilize the forest produce; and in any case, all pre-existing rights acquired by the people in the forests should be strictly protected. Fernow concludes with the strongly-expressed advice that a law should be passed reserving the relics of the forests of the Union, and preventing any fresh alienations. He firmly believes that such a law is most urgently required. It is, however, quite a different matter for Congress to pass any such law, though more may perhaps be expected from the separate States in the Union, and in those of New York and California some rather halting steps have been taken in the right direction.

As matters stand at present in the United States, it is pretty obvious that a time will come when landowners will look upon their private forests as a good investment, for prices of wood and other forest produce are steadily rising. Little progress has, however, yet been made in this direction, and recent attempts made by some rich men to manage their forests properly with advantage have failed.

Sir Dietrich Brandis then turns to the progress made in the study of American forest trees, and states that literature on the subject is pretty abundant, but is after all merely thrashing straw. What is wanted in America is a practical proof that in forests of the Weymouth pine, of Minnesota, or of Californian red wood, or of Douglas fir in Washington and Oregon, or in the splendid mixed broad-leaved forests of the Alleghany mountains, good forest management will prove more remunerative than wasteful pillage (*Raubbau*).

The remainder of Brandis's paper is chiefly of botanical interest, and greatly praises Sergent's magnificent work. One other passage is too interesting to be omitted. It refers to the mesquit tree, *Prosopis juliflora*, which belongs to the dry zone in the south-west of the United States, and is also found in Mexico, and in the Andes as far as Chili and Argentina. In the river valleys of Arizona, where, although the air is dry, yet subsoil water is near the surface of the ground, this species forms extensive forests. On drier soils the aerial parts of the tree are reduced, but the root system is greatly extended. Sergent states that while the stem may be only a few inches high, and may only bear a few leaves, yet the tap root goes straight down to the subsoil water, and the aerial growth of the tree furnishes a clear indication of the depth at which the latter may be found.

Wherever the mesquit is a tree the subsoil water is forty to fifty feet down, where it is a small shrub it is from fifty to sixty feet down, and wherever the roots descend over sixty feet, the plant is not more than two or three feet high. In the scantily-wooded districts, where the mesquit tree grows, its roots yield most of the firewood, and are dug up, or dragged by oxen from the ground. *Prosopis spicigera* in the drier parts of India similarly furnishes fuel and cattle fodder in the Punjab, Sindh, and parts of Berar. This tree, there termed the *Jhand*, sends down its roots to a depth of fifty feet and more, to the subsoil water, and thus produces wood in a dry country, providing the peasant with fuel and wood for his plough.

W. R. FISHER.

JOHN STRONG NEWBERRY.

IT is not only in the United States that the death of this veteran of scientific research will bring widespread regret. To many geologists and palæontologists in this country and on the Continent he was personally known, and those whom he honoured with his friendship will feel keenly the loss they now sustain. He was born at New Windsor, Connecticut, on December 22, 1822,

© 1893 Nature Publishing Group